



**UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
022901	02/27/00	CATHEY	11675.23

022901
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MMC2/0811

EXAMINER
PARK, J

ART UNIT	PAPER NUMBER
2822	

DATE MAILED: 08/11/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trad marks

Office Action Summary

Application No.

09/031,617

Applicant(s)

CATHEY ET AL.

Examiner

James Park

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☒ Responsive to communication(s) filed on 18 July 2000.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 and 31-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 and 31-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
2. ☐ received in Application No. (Series Code / Serial Number) _____.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- 15) ☐ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9.
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other:

DETAILED ACTION

This office action is in response to the Amendment B and the Supplemental IDS filed on 7-18-00. The Applicant has canceled claims 26-29.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-25 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted Prior Art in view of Sukharev (5,710,079).

The admitted prior art discloses all the limitations of claims 1-25 as follows: to form a discrete region (Fig.2 Ref.34), form an oxide layer covering the discrete region (Fig.2 Ref.36) and etching a contact opening through the oxide layer to contact discrete region and wherein the surface of the contact opening is covered with the barrier layer (Fig.2), the source gas comprises an organometallic compound (Pg.6 Lns.14-15), metallizing the contact opening with a metallization material (Fig.2 Ref.40 and 42), the barrier layer functions as a diffusion barrier to prevent the metallization material from contacting the discrete region (Pg.6 Lns.1-2), metal oxide film of the barrier layer is selected from a group consisting of a conductive metal oxide, Ru oxide film, and aluminum oxide film (Pg.6 Lns.7-13), barrier layer functions as an etch stop (Pg.6 Ln.9), and source gas is selected from the group consisting of aluminum trimethane, titanium tetramethane, a vaporized tantalum in the form of an organometallic compound,

trimethyl aluminum hydrate, a Ru metalorganic precursor, and dimethyl aluminum hydrate (Pg.6 Ln.16). The prior art does not disclose to react the source gas with an ozone gas in a CVD process and ozone gas volatilizes and frees into the atmosphere substantially all of the carbon contained in the source gas.

Sukharev discloses all the limitations that the prior art didn't as follows: to react the source gas with the ozone gas to form a barrier layer of metal oxide film (Col.3 Lns.11-25), source gas comprising an organometallic compound (Col.3 Ln.16), and ozone gas volatilizes and frees all the carbon contained in the source gas (Col.4 Lns.14-24). Also, the listing of ranges in the claims does not automatically distinguishes the claimed invention over the cited art because it is considered to be obvious to one of ordinary skill in the art to adjust the pressures and the temperatures of the invention, since it has been held that where general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. In any case, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed pressure and temperature limitations because applicant has not disclosed that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another range of pressures. Indeed, it has been held that optimization of range limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. It would have been obvious to one of ordinary skill in the art to combine when one teaches how to lay down a certain layer in depth and the other does not but mentions that process. It would have

been obvious to one of ordinary skill in the art to use ozone instead of oxygen to react with the source gas as pointed out in Sukharev. Sukharev's preferred embodiment is SiO_2 , however, see Col.2 Lns.42-55 for other materials, including metals, that can be used in Sukharev's process. Moreover, SiO_2 is a metal oxide.

Response to Arguments

3. Applicant's arguments filed on 7-18-00 have been fully considered but they are not persuasive.
4. The applicant's have argued that SiO_2 is not a metal oxide and that the cited prior art in *Sukharev* give as examples of organometallic compounds that are phosphorous-based, silicon-based and boron-based organic compounds, with no metal-carbon bond and no transition, lanthanide, actinide, or main group metal atom. The cited prior art in *Sukharev* may not have disclosed all the possible organometallic compounds, in column 8 line 30, *Sukharev* states that there are more possible organometallic compounds with "etc.". *Sukharev* also states that these organometallic compounds (*and others*) may be employed to deposit thin films of tungsten, titanium, tantalum silicides, *for example*. (emphasis added) The cited prior art in *Sukharev* is not merely limited to what the reference is expressly taught, but inferences therefrom all disclosures of prior art, including unpreferred embodiments must be considered. *In Re Lamberti* 192 USPQ 278 The cited prior art in *Sukharev* may not expressly teach to form a metal oxide layer but teaches that materials such as "dielectrics, semiconductors, and *metals* used in fabricating ICs and other semiconductor devices." (Col. 3 Line 20) SiO_2 is just an example of what is done in *Sukharev* and it is just one embodiment of the invention. In col 3, lines 11-25,

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discloses that "the deposited materials may be any material that can be produced from decomposition of an organometallic with the aid ozone."

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Park whose telephone number is (703) 306-5712. The examiner can normally be reached on Monday through Friday, from 8 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on (703) 308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 908-1782 for After Final communications.

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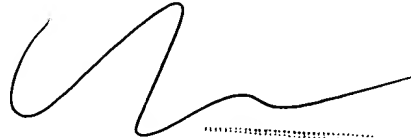
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

JP

JP

August 8, 2000

A handwritten signature in black ink, appearing to read 'Mary Wilczewski', with a horizontal line underneath.

Mary Wilczewski
Primary Examiner